

WESTERN AUSTRALIAN POLYPLACOPHORA.

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PLATES XXIV. AND XXV.

In the September, 1910, number of the Proceedings of the Malacological Society of London, vol. ix., part 3, p. 153, Mr. Tom Iredale has some "Notes on Polyplacophora, chiefly Australian." On p. 159, Mr. Iredale says: "I conclude that the chiton fauna of Western Australia will be of a most interesting nature."

Through the courtesy of Dr. J. C. Verco, the President of the Royal Society of South Australia, I was able during the Christmas vacation of 1910-11 to make a fairly thorough exploration of the south coast of Western Australia from Esperance to Albany, and the west coast as far north as Fremantle.

The places visited were Esperance, Hopetoun, Albany, Ellenbrook and Yallingup (south of Cape Naturaliste), Geographe Bay, Rottnest Island, and Fremantle Harbour. With the assistance of Mr. Hedley, conchologist (of the Australian Museum, Sydney), and Mr. Basset Hull, of Sydney, I have been able to identify twenty-three species of Western Australian polyplacophora similar to South Australian species and nine others, seven of which I take to be new.

As Mr. Iredale suggests in the paper mentioned, the list contains representatives of the Adelaidean region. At least fifteen of the identified species are found in his Adelaidean list, one is classified as Solanderian, two are in the Peronian, and three are in the "Doubtful Position" list. The seven new species will probably represent the Autochthonian element to which Mr. Iredale refers.

The small rise and fall of the tides (not more than 2 or 3 ft.) on the visited parts of the Western Australian coast make chiton hunting much more precarious than in South Australian waters. While a large number of South Australian chitons are found in Western Australia, yet there are some striking differences.

I have traced *Plaxiphora albida*, Blain, locally known as *P. petholata*, Sby., all round the South Australian coast from MacDonnell Bay to Murat Bay, a distance of nearly a

thousand miles of coastline, but going out from Murat Bay to St. Francis Island (Nuyts Archipelago), a distance of 40 miles, *Plaxiphora costata*, Blain, formerly known as *P. glauca*, Q. et G., takes the place of *P. albida*, and specimens of *P. costata* were found in Western Australian waters. *P. albida*, Blain., is generally found on or above high-water mark in South Australia, but on the Western Australian coast its place is taken by *Liophura georgiana*, Q. et G. These could be frequently seen on exposed rocks. The order of exposure in South Australian waters, *mutatis mutandis*, is *P. albida*, on exposed rocks at or near high-water mark; *I. crispus*, in abundance everywhere, in sheltered pools, a foot or two below, with *Acanthochites* on sandy moss-covered rocks. In deeper pools, *I. contractus*, *I. cariosus*, *I. ustulatus*, *I. smaraydinus*, and other *Ischnochitonidae*, and deeper still in 2 or 3 ft. of water at low tide, the true chitons, *jugosus*, *tricostalis*, *exoptandus*, and *calliozona*. On the west side of St. Vincent's Gulf I have found the true chitons on exposed rocks in shallow pools.

The order in which Western Australian chitons are found is *Liophura georgiana*, near or above high-water mark (*P. albida* and *I. crispus* are missing), and on account of the small fall of the tides *Chitons*, *Callochitons*, and *Ischnochitons* may be found together. The *Ischnochitonidae* favour shallow pools, while the true chitons prefer the ocean surf.

Chiton torrianus was found in Western Australia on the under-side of wholly exposed rocks. This chiton, formerly misnamed *coxi*, was separated by Hedley and Hull as *C. torri*, afterwards altered to *torrianus*. It was rarely found in South Australian waters till Mr. Walter Klem, of Corney Point, Yorke Peninsula, discovered a number. In Western Australia it was found in almost every place visited.

It is hoped that this first paper on Western Australian Polyplacophora may do something to stimulate and help future beginners at chiton-hunting in Western Australia.

My acknowledgments are due to Mr. W. T. Bednall, whose excellent paper on South Australian Polyplacophora, Proc. Mal. Soc., London, vol. ii., part iv., April, 1897, has been the foundation of much of my work, and to whose paper I have had frequently to refer; also to Mr. M. M. Maughan, B.A., for his kindly revision of my paper and his assistance in examining my new species and verifying some of my descriptions.

1. CALLOCHITON PLATESSA, Gould, 1846.

Chiton platessa, Gould, Proc. Bost. Soc., N.H. II., 1846, p. 143; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 49.

Three specimens collected. It is common in New South Wales, rare in the Adelaidean and Western Australian regions. Specimens obtained at Rabbit Island (Albany), Ellenbrook, and Rottnest Island. Colour markings resemble New South Wales species. Dark-red with splashes of orange and olive-green. About 20 valves of a bright-pink colour, picked up at Ellenbrook, were evidently bleached specimens of *platessa*.

2. ISCHNOCHITON (STENOCHITON) JULOIDES, Ad. and Ang., 1864.

Stenochiton juloides, Ad. and Ang., Proc. Zool. Soc., 1864, p. 193; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 55.

Two anterior valves and one median valve of this very slippery chiton were collected in shell-sand at Albany.

3. ISCHNOCHITON CARIOSUS, Carpenter, 1873.

Heterozona cariosa, Carpenter, MS.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 65.

Numbers of these were found at Rottnest Island, Albany, Hopetoun, Yallingup, and Ellenbrook (south of Cape Naturaliste). The Western Australian specimens are much less coated with serpularia, etc., than the South Australian species.

4. ISCHNOCHITON USTULATUS, Reeve, 1847.

Chiton ustulatus, Reeve, Conch. Icon., sp. 102; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 96.

Several specimens were taken on the west coast at Rottnest Island and Yallingup. None were found on the south coast. This chiton travels easily. One collector reports finding them in abundance at one spot in South Australia, but they had all vanished a few days later.

5. ISCHNOCHITON CRISPUS, Reeve, 1847.

Chiton crispus, Reeve, Conch. Icon., sp. 120; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Ischnochiton Haddoni, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 88.

The specimens classified as *I. crispus* are either so small or in such bad condition that I have hesitated in allowing *crispus* to appear at all. They were found only in the places examined nearest to the South Australian border, Esperance and Hopetoun. It is interesting to find that a chiton so common in South Australia and Victoria should be so rare in Western Australia. The specimens found closely resemble our South Australian *I. variegatus*, which is probably only a variety of *I. crispus*.

6. ISCHNOCHITON CONTRACTUS, Reeve.

Chiton contractus, Reeve, Conch. Icon., sp. 78; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

Chiton pallidus, Reeve, Conch. Icon., sp. 92; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Fairly common in sheltered pools on the south coast. I have specimens from Hopetoun and Albany.

7. ISCHNOCHITON DECUSSATUS, Reeve, 1847.

Chiton decussatus, Reeve, Conch. Icon., sp. 107; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

Chiton castus, Reeve, Conch. Icon., sp. 145.

Lepidopleurus speciosus, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192.

Two specimens were taken from buoys between Fremantle and Rottnest Island. Through the courtesy of the harbour-master we were permitted to be present at the lifting and cleaning of the buoys. *I. decussatus* is frequently found attached to such shells as *Pinna inermis*, Tate.

8. ISCHNOCHITON PTYCHIUS, Pilsbry.

Ischnochiton ptychius, Pilsbry, Nautilus, vol. viii., p. 53.

Ischnochiton ptychius, Bednall, Proc. Mal. Soc., vol. ii., part 4, April, 1897.

One specimen of this rare chiton was taken from the anchor of a buoy between Fremantle and Rottnest Island.

9. ISCHNOCHITON VIRGATUS, Reeve.

Chiton virgatus, Reeve, Conch. Icon., sp. 192; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 78.

Several specimens were found at the Quarantine Station, Albany. Some of my specimens are of a creamy-white, which may possibly need to be placed under a new species.

10. ISCHNOCHITON THOMASI, Bednall, 1896.

Ischnochiton Thomasi, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One diminutive specimen was dredged from 20 fathoms in Geographe Bay.

11. ISCHNOCHITON RESPLENDENS, Bednall and Matthews, 1906.

Ischnochiton resplendens, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

Several specimens of this beautiful chiton were taken at Yallingup, and an anterior valve at Ellenbrook, both south of Cape Naturaliste, and also at Albany. No specimen of its close ally *I. smaragdinus* was seen.

12. **CALLISTOCHITON ANTIQUUS**, Reeve.

Chiton antiquus, Reeve, Conch. Icon., sp. 169; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 274.

Specimens were obtained at Albany, Ellenbrook, and Yallingup.

13. **CHITON TRICOSTALIS**, Pilsbry, 1894.

Chiton (canaliculatus, var. ?) tricostalis, Pilsbry, Nautilus, vol. viii. (1894), p. 54.

Two specimens from Ellenbrook, south of Cape Naturaliste, one dark olive-green mottled with creamy-white, terra-cotta, and light-green, the other terra-cotta with splashes of red and white.

14. **CHITON TORRIANUS**, Hedley and Hull, 1909.

Chiton torri, Hedley and Hull, Records of the Australian Museum, Sydney, vol. vii., No. 4, 1909, p. 162.

Chiton Hullianus, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 103.

Chiton torrianus, Mal. Soc. Journal, March, 1911, vol. ix., pt. iv.

Numerous specimens of this handsome chiton were taken at Esperance, Albany, Yallingup, Ellenbrook, and Rottnest Island. Valves were plentiful on the beaches. I have them up to 50 mm. in length. It is evidently one of the common chitons of Western Australia.

15. **CHITON BEDNALLI**, Pilsbry, 1895.

Chiton Bednalli, Pilsbry, Nautilus, vol. ix., p. 90, December, 1895.

One median valve of this, the most beautiful of all our chitons, was dredged from 20 fathoms in Geographe Bay. Most of the specimens taken in South Australia have been dredged.

16. **CHITON EXOPTANDUS**, Bednall, 1897.

Chiton exoptandus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One anterior valve and one median valve were taken from 20 fathoms in Geographe Bay.

17. **LORICA VOLVOX**, Reeve, 1847.

Chiton volvox, Reeve, Conch. Icon., sp. 31; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 237.

Chiton cimolius, Reeve, Conch. Icon., sp. 141.

Valves of this very large species were picked up at Rottnest Island and Ellenbrook, south of Cape Naturaliste.

18. PLAXIPHORA COSTATA, Blain.

Chiton costatus, Blain, Dict. Sc. Nat., xxxvi., p. 548; Pilsbry, Man. Conch., vol. xv., p. 105.

Plaxiphora glauca, Quoy and Gaim.; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

Chiton glaucus, Quoy and Gaim., Voy. Astrolabe, Zool. iii., p. 376.

Plaxiphora glauca, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 325.

Plaxiphora costata, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 97.

Mr. Iredale says: "Blainville's *costatus* is easily recognizable as the species I have noted as *glaucus*, Q. et G." He agrees with Dr. Thiele in his "Revision des Systems der Chitonen" in placing *P. petholata*, Sow., as *albida* of Blainville and *P. glauca*, Q. et G., as *costatus*, Blain.

Good specimens of *P. costata* were found at Rottnest Island, Albany, and Bunbury, and valves were plentiful at Ellenbrook and Yallingup.

I notice that Blainville took *P. costata*, or, as he named it, *Chiton costatus*, from the "Port of King George." Western Australia, therefore, is the first locality where the shell was found. Quoy and Gaimard found it in d'Entrecasteaux Channel, Tasmania.

19. ACANTHOCHITES ASBESTOIDES, Smith, 1884.

Chiton (Acanthochiton) asbestoides (Carpenter, MS.), Smith, Zool. Coll., H.M.S. "Alert," p. 833; Pilsbry, Man. Conch., ser. i., vol. xv., p. 17.

Acanthochites asbestoides, Carpenter; Pilsbry, Proc. Acad. Nat. Sec., Philad., 1894.

Two specimens taken at Albany.

20. ACANTHOCHITES SPECIOSUS, H. Adams, 1861.

Cryptoplax (noloplax) speciosus, H. Adams, Proc. Zool. Soc., 1861, p. 385.

Acanthochites speciosus, H. Adams, Pilsbry, Man. Conch., ser. i., vol. xv., p. 32.

One specimen of this rare shell was found at Rabbit Island, near Albany.

21. ACANTHOCHITES VERCONIS, Torr and Ashby, 1898.

Acanthochites Verconis, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217.

One specimen dredged from 20 fathoms at Geographie Bay. Mr. Hedley, conchologist, of Sydney, is unable to separate *A. Verconis* from *A. Wilsoni*, of Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

22. CRYPTOPLAX STRIATUS, Lamarck, 1819.

Chitonellus striatus, Lam., An. S., Vert. vi., p. 317, 1819.

Cryptoplax striatus, Pilsbry, Man. Conch., ser. i., vol. xv., p. 53.

This chiton was taken at Hopetoun, on the south coast, and at Yallingup, on the west coast. Valves were obtained at Hopetoun, Ellenbrook, and dredged from 20 fathoms in Geographe Bay. I concur with Messrs. Gatliffe and Bastow, of Melbourne, in placing the hairy, seal-like specimens with *striatus* and the hairless one with *var. Gunnii*, of Reeve.

23. CRYPTOPLAX STRIATUS, *var. GUNNII*, Reeve.

Chitonellus gunnii, Reeve, Conch. Icon., sp. 5.

Cryptoplex striatus, var. *Gunnii*, Pilsbry, Man. Conch., ser. i., vol. xv., p. 54.

Two specimens of this hairless species were found at Yallingup. They are both destitute of the "minute calcareous spinelets" of *striatus*. The valves are narrower, and in both specimens of a deep-pink colour. When examined with *striatus* they seem worthy of being placed in a distinct species.

NOTE.—The foregoing 23 species are all found in South Australian waters.

24. LIOLOPHURA GEORGIANUS, Quoy and Gaimard, 1835.

Chiton Georgianus, Quoy and Gaim., Voy. "Astrolabe," Zool., 1835, iii., p. 379, t. 75, f. 25-30.

Liolophura Georgiana, Quoy and Gaim.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 241.

Chiton Georgianus, Iredale, Proc. Mal. Soc., London, vol. ix., part 3, September, 1910.

The type specimen was found by Quoy and Gaimard at King George Sound, South-west Australia (Port du Roi-Georges). Mr. Iredale says that the type appears to have been lost. It is the commonest chiton in Western Australian waters. The specimens I have dissected correspond to Quoy and Gaimard's description. It certainly is not a true chiton, and I have not been able to discover the presence of eyes necessary to place it among *Liolophura*; but this may be accounted for by the fact that it is exceedingly difficult to get a clean specimen. They are either very much eroded or covered with calcareous matter and other foreign growths.

I have been assisted in my nomenclature by Messrs. Hedley and Hull, of Sydney.

L. georgiana was seen in every place visited, Esperance, Albany, Ellenbrook, Yallingup, and Rottnest Island. Some years ago one specimen with the girdle removed was sent to

me from Eyre Patch, Western Australia, not far from the South Australian boundary. It is often found high and dry in crevices of rocks at and above high-water mark. It is remarkable that no specimens have been discovered in South Australian waters when it is so common in Western Australia. It occupies a similar position in Western Australia to that taken by *Plaxiphora albida* in South Australia.

The figure in Pilsbry, vol. xiv., plate 53, figs. 36-40, shows the concentric marking and the beaks of the valves very distinctly. My specimens are nearly all much worn, and only a few valves retain the beak; the more perfect specimens show both the beak and rows of concentric polished pustules on the anterior valve, radiating from the apex.

25. ONITHOCHITON QUERCINUS, Gould, 1846.

Chiton quercinus, Gould, Proc. Bost. Soc. Nat. Hist., 1846, vol. ii., p. 142; U.S. Expl. Exped. Moll., p. 312, figs. 437, 437a: *Otia*, Conch., p. 3.

C. (Onithochiton) quercinus, Gould, *Otia*, Conch., p. 242.

C. Incii, Reeve, Conch. Icon., 1847, No. 94.

Onithochiton rugulosus, Angas, P.Z.S., 1867, pp. 115, 223.

O. Incii, Angas, P.Z.S., 1867, p. 223.

O. Lyelli (non Sow.), Pilsbry, Man. Conch., vol. xiv., p. 247.

O. quercinus, Gould; Pilsbry, Man. Conch., vol. xiv., p. 248.

O. rugulosus, Angas; Pilsbry, Man. Conch., vol. xiv., p. 249; Proc. Acad. Nat. Soc., Phil., 1894, p. 88.

O. Incii, Reeve; Thiele, Zoologica Chim., Heft. lvi., p. 99.

O. quercinus, Gould; Iredale, Proc. Mal. Soc., London. vol. ix., part 2, June, 1910.

Specimens of this very beautiful chiton were taken at Esperance, Albany, Ellenbrook, and Rottnest Island. On the outlying reefs at Rottnest they could be seen crawling over the reefs very energetically. Gould's type specimen was a small one—length, 22 mm.; breadth, 15 mm. I have a dried specimen, slightly curled, taken at Port Esperance—length, 52 mm.; breadth, 23 mm. It is beautifully coloured. Those found on exposed rocks were covered with foreign matter. I have to thank Messrs. Hedley and Hull for the identification of this species.

Unfortunately I have not had access to a description of *Onithochiton Scholviensi*, Thiele, Zool. Chun. 1909. Heft. lvi., p. 99. Mr. Iredale says in the paper quoted that the specimens in the British Museum are labelled "West Australia." He thinks that is correct. My specimens of *O. quercinus* vary considerably. It is possible that I may be able to place some of them with *Scholviensi*.

26. ISCHNOCHITON VERCORIS, *sp. nov.*

Plate xxiv., figs. 1a, b, c, d, e, f.

Mr. Hedley says: "This is certainly a new species and a magnificent one. One would need to disarticulate a valve to be sure of the classification. Probably it is an *Ischnochiton*, and perhaps of the section *Ischnoradsia*." As only one specimen was found I am not disarticulating, but hope to supplement my description later.

General Appearance. Shell elliptical, flattened, side slopes curved. Colour, uniformly slate-grey, tending to heliotrope. Girdle and valves of the same colour.

Anterior Valve. No very distinct markings. Surface rough with irregular concentric growth lines and minute longitudinal striae. Eight teeth.

Posterior Valve. Mucro-median, prominent; divided into two distinct areas by a slightly-raised riblet running up to the mucro. The anterior half has longitudinal colour markings with microscopic nodulose lines. To the unaided eye it seems smooth. The posterior half has concentric irregular nodulose lines similar to the anterior valve.

Median Valve. The pleural and dorsal areas run together, while the lateral area is very distinct. The dorsal area is smooth, horny, with brown-pencilled longitudinal lines and microscopic zigzag striations. The pleural area has very delicate longitudinal markings. The lateral area is distinctly raised and has a lighter shade of colour than the pleural. The very slight longitudinal and lateral markings give it a textile appearance.

Girdle. Clothed with imbricating scales, curved, apices suberect; under the microscope the scales are beautifully frosted over and show about ten transverse parallel grooves. The girdle is one-third of the depth of the lateral area, about 3 mm. across.

Interior. Bluish-grey colour with broad sinus and dark splashes near the sinus of each valve. The anterior valve has delicate brown pencillings from the sinus to half its depth with eight riblets.

Measurement. Dried specimen. Length, 44 mm.; breadth, 28 mm.

Habitat. Rockpool, inside reef, Ellenbrook, south of Cape Naturaliste, Western Australia.

Remarks. It is different in shape from any Australian Ischnochitons, and the only specimens in my collection of similar shape are *Mopolia lynosa*, Gould, from California, and *Chiton Magnificus*, Deshayes, from the Philippines. This species has been named after Dr. Verco, to whose generosity

I have been indebted for the opportunity of exploring Western Australian *Polyplacophora*.

27. **PLAXIPHORA HEDLEYI, sp. nov.**

Plate xxiv., figs. 2a,b,c,d,e,f.

General Appearance. Shell ovate, narrowing toward the anterior, side slopes curved. Colour pale-green with five black and white zebra stripes in the pleural area. The articulum is a milky-white with dark splashes at the sutures.

Anterior Valve. Radially ribbed with eight rounded costæ dying off toward the apex. These correspond with the eight slit rays in the interior of this valve.

Posterior Valve. Insertion plate smooth, unslit, like all plaxiphora. Sinus broad and rounded. Insertion plates large. Colour, milky-white, splashed with brown and black stripes.

Median Valve. Dorsal area beaked, forming an equilateral triangle, with a central ridge almost smooth and splashed longitudinally on its posterior margin, with black-and-white stripes varying in different valves. In one valve microscopic striae run out diagonally from the central area. To the unaided eye the dorsal area is pale-green, smooth, and horny. The division between the dorsal and pleural areas is distinctly marked by five white and five black zebra bands, small toward the apex and lengthening toward the girdle. The pleural and lateral areas seem to run into one another, a slightly raised radial rib marking the division. The pleural and lateral areas have a mottled appearance, with splashes of brown and white or black and white. The internal part is a milky-white with a distinctly-raised rib, broad at the apex and narrowing off to one tiny slit. The sinus is broad and the sutural plates neatly curved.

Girdle. Leathery with microscopic granulations. Narrow with sutural horny protuberances, some spikes remaining. Colour alternately black and white, black at the valves and white at the sutures, 11 or 12 stripes of each colour on each side.

Measurement. Dried specimen. Length, 16 mm.; breadth, 11 mm.

Habitat. Rabbit Island, Albany. Two live specimens and one median valve.

Remarks. This specimen has been named after Mr. Hedley, conchologist, whose wide conchological information has helped many a beginner. The zebra-like stripes will cause this specimen to be easily distinguished.

28. *ACANTHOCHITES SUBVIRIDIS*, *sp. nov.*

Plate xxv., figs. 3a, b, c, d, e, f.

General Appearance. Shell elongated, narrow, carinate, side slopes curved. Colour creamy-white with a pale-green tint on some of the valves, a brighter green on the dorsal area with a pink-tipped beak in some specimens; girdle dark-buff.

Anterior Valve. Strongly marked with fine granulose, radiating costæ corresponding to the five slit rays. The sutural plates are much larger than the tegmentum. Internally milky-white with a curved sutural band.

Posterior Valve. Distinctly marked with dorsal and latero-pleural areas. The dorsal area is a smooth ridge, irregularly transversely striated, terminating in fine radial riblets, which are continued in the sutural plates as slit rays. The latero-pleural area is covered with squamose granules. Sutural plates large, sinus wide.

Median Valve. Dorsal and latero-pleural areas same as posterior valve with the exception of two postmedian granulose radial riblets, one on the anterior margin. In some specimens these riblets are strongly pustulose, small at the apex, and increasing in size toward the margin. Internally one slit ray, sutural plates large, sinus medium. The dorsal area is a pale-green colour, with in some cases a pink tip. In others it is a dark-buff.

Girdle. Leathery, very broad, 7 sutural tufts on each side, and 4 round the anterior valve. Elementary spicules may be seen in one or two. Colour dark-buff, resembling the girdle of *Cryptoplax Gunnii*.

Measurement. Length, 22 mm.; breadth, 12 mm.

Habitat. Four specimens from Rabbit Island, Albany.

Remarks. I was very much inclined to place this specimen under *A. costatus*, Ad. and Ang., Pilsbry, Man. Conch., ser. i., vol. xiv., p. 40, but the *distinctly pustulose riblets* and coloured dorsal areas with other minor differences have led me to place it under a new species. Adams and Angas' drawing of *A. costatus* gives a very diminutive riblet. The minute fringe of white spicules, described by E. A. Smith, Zool. Coll. "Alert," p. 83, t. 6, f. F., as *Chiton (Macandrellus) costatus*, is absent in all the specimens. The greenish tint so common has given its name, *subviridis*.

29. *TONICIA HULLIANUS*, *sp. nov.*

Plate xxv., figs. 4a, b, c, d, e, f.

General Appearance. Shell elliptical, broad, smooth, back rounded, side slopes curved, valves distinctly beaked.

Colour reddish-buff, mottled on dorsal areas, turning to deep-red on some of the lateral areas, a few minute irregular black and white spots. Second valve larger than any of the following five. The forward part of the lateral areas and the posterior and anterior valves bear radiating rows of eye-dots.

Anterior Valve. About 15 or more fine striæ radiating from the apex with a slightly raised rib between each pair. These rays are really the eye-dot lines. I counted 15 eyes in one ray. There seems to be on either side a sort of flesh-coloured lateral area. The rest of this valve is a pale-pink, mottled with cream. Dentition: Eight slits are distinctly visible, but as I have only one specimen I have not dissected it. The insertion teeth are pectinated.

Posterior Valve. Large, mucro median *rectangularly elevated*. The dorsal area is smooth, beaked with irregular lateral striæ. The eye-dots radiate from the mucro to the insertion plate. Colour dorsal and posterior area pink, mottled with cream, and on each side corresponding to the lateral area which is of a rich red colour. The insertion plates are pectinated with probably a dozen slits.

Median Valves. Dorsal area is V-shaped, curved, and beaked, colour pinky-buff, mottled with cream. Pleural area small, flesh- or buff-coloured, depressed with concentric growth lines running from lateral into pleural and dorsal areas. Lateral areas, some flesh-coloured, others mottled as in the dorsal areas, five or six irregular flattened ribs. Eye-dots irregular on the anterior half of each valve. Insertion plates, one slit, pectinated. The sutural plates are diminutive, sinus shallow and pectinated, and the interior is porcelain-white.

Girdle. Leathery, nude. Breadth in dry state, 2 mm. Colour light-brown.

Measurement. Dried specimen. Length, 30 mm.; breadth, 20 mm. Divergence, 125°.

Habitat. Rockpool, Ellenbrook, south of Cape Naturaliste. One live specimen and one median valve.

Remarks. The Genus *Tonicia* is somewhat rare in Australian waters. I have named this very handsome species after Mr. A. F. Basset Hull, whom Mr. Iredale describes as "the most enthusiastic chiton student in Australasia."

30. *LEPIDOPLEURUS NIGER*, *sp. nov.*

Plate xxv., figs. 5a,b,c,d,e,f.

General Appearance. Shell small, broad in proportion to length. Valves rounded and raised. Regular granulose striations are microscopically conspicuous. Colour dark

slatish-grey on anterior and 5 median valves, posterior valve almost black.

Anterior Valve. Longitudinally parallel rows of pustules.

Posterior Valve. Almost black; umbo postmedian, with concentric pustulose striae.

Median Valves. Regularly longitudinally granulose striated. No difference in the dorsal, lateral, and pleural areas.

Girdle. Diminutive, dark, scaly, and with spicules.

Habitat. Under stones in shallow pools at Hopetoun, Western Australia. Only one specimen was found.

Measurement. Dried specimen. Length, 4 mm.; breadth, $2\frac{1}{2}$ mm.

Remarks. I had classified this as *L. Matthewsianus*, Bednall, which is so common in South Australian waters, but on comparing them I found it much broader in proportion to its length, and the body of the animal which is uniformly red in *L. Matthewsianus* is almost black in *L. Niger*. I then placed it with *L. Badius*, Hedley and Hull, and found it very similar, with the exception that the grain rows were distinctly regular. Its dark appearance has given its name.

31. PLAXIPHORA ZEBRA, sp. nov.

Plate xxv., fig. 6.

A beautiful median valve was collected at Port Esperance and is worthy of a name. The valve is rounded. The *dorsal area* is indistinct with 10 irregular creamy tear-drop pustules in the centre forming a V with diagonal striations terminating in the anterior part of the valve. The lateral part of the dorsal area has three or four transverse striae continued into the pleural area. The colour is a delicate pink, mottled with white and brown splashes. The *pleural area* has a number of zigzag pustulose riblets running into the striations coming from the dorsal area and narrowing toward the apex. Colour: Five alternate splashes of bright-red and creamy-white give the shell its name. The lateral area is distinctly raised with two rows of 9 or 10 large pustules on its anterior and posterior margins with a sulcus between, irregularly pustulose and striated. The pustules have the tear-drop appearance of those in the dorsal area. Interior is porcelainous, sinus curved, broad, shallow, and pectinated. The sutural plates are small, one slit. The anterior part of the valve is folded over and an irregular sulcus is formed, terminating in the slit. The specimen may have been bleached, so that the pink splashes in the pleural area may have been brown or black.

The markings are very like *P. Hedleyi*, but the lateral area makes a distinct species.

Habitat. Port Esperance. One median valve.

32. **PLAXIPHORA PUSTULOSA, sp. nov.**

Plate xxv., fig. 7.

One median valve was taken at Albany and is in perfect condition. The valve is slightly arched and beaked. The posterior part of the dorsal area has 12 bright-brown transverse riblets divided by pale-green striae, rather crowded toward the posterior. These riblets are continued into the pleural area in rows of bright shiny pustules, longitudinally parallel, and diminishing in number from seven near the dorsal area to one at the insertion plate. The lateral area is slightly raised, but very distinct. It has three or four radiating rays of the tear-drop pustules.

Interior. The sinus is gracefully curved, colour rich dark-brown, slightly pectinated. The sutural plates are small. The rear part is folded over, making a white limy sulcus, ending in one slit at the insertion plate.

Habitat. Albany, Western Australia. One median valve.

Brighton,
South Australia.

EXPLANATION OF PLATES.

PLATE XXIV.

1a, b, c, d, e, f—*Ischnochiton verconis*, sp. nov.
2a, b, c, d, e, f—*Plaxiphora hedleyi* sp. nov.

PLATE XXV.

3a, b, c, d, e, f—*Acanthochites subviridis*, n. sp.
4a, b, c, d, e, f—*Tonicia hullianus*, sp. nov.
5a, b, c, d, e, f—*Lepidopleurus niger*, sp. nov.
6—*Plaxiphora zebra* (median valve), sp. nov.
7—*Plaxiphora pustulosa* (median valve), sp. nov.

- a—Dorsal view of entire shell.
- b—Anterior valve.
- c—Median valve.
- d—Posterior valve.
- e—Lateral view of posterior valve.
- f—Portion of girdle magnified.

Sizes of type specimens are marked in each case